



Potassium Fertilization of Pastures and Hayfields

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Potassium (K) is an essential nutrient for forage production required by plants in greater amounts than any other nutrient except nitrogen (N). Despite its important role in sustaining forage production and persistence, K fertilization has received much less attention than N fertilization. Reduction in forage production due to low K supply has been well documented in several previous studies in Florida and elsewhere. Numerous field observations in Florida also demonstrated a correlation between pasture decline and K deficiency, particularly in intensive production systems such as hayfields where the grass is harvested multiple times a year. It is also not uncommon in many forage production systems in Florida to see soil fertilization practices focused solely on N fertilizer applications. In the long run, this approach leads to significant reduction in soil K levels with subsequent negative impacts on pasture productivity.

In addition to management factors, most soils used for forage production in Florida exhibit low K retention capacity, therefore, repeated application of K is often required to meet plant requirements. Lack of K negatively impacts forage production and stand integrity and often increases pest and disease incidences. Several studies have demonstrated the important role of K fertilization on rhizome production, root development, stand persistence, and plant resistance to disease and pest injury. Similarly, many studies have also shown that adequate levels of soil K reduce forage winter injury and increase survival after freezing temperatures. These reports suggested that first visual signs of stand decline due to K limitation are more frequently observed in the initial spring regrowth.

Lack of K can also limit the ability of the plants to utilize applied N. While the addition of N increases yield, it also stimulates additional uptake of other nutrients. Several studies demonstrated that greater rates of K are required to obtain higher yields expected at higher N rates. If soil K supply is low, yield increase in response to N fertilization can also be reduced. As the soil reserves became more depleted in K, marginal crop responses to added N (or any other nutrient) are expected to occur.

Intensive management, especially high N applications, increase yield responses to K fertilization. Various reports in the early 70's concluded that most warm-season grasses required between 200 to 400 lb K₂O/A per year. Although these high K application rates can increase forage yields, they are likely not economical in many production systems. Similarly, maintaining soil test K at medium or higher levels can be highly expensive and difficult to achieve in Florida soils due to their limited K retention capacity. On the other hand, because extreme low K supply may also represent an economic risk, efforts should be focused on replacing K removed with harvested forage. Site management history along with soil testing can provide a good estimate of K status.

Potassium application rate, frequency, and time of application should follow the University of Florida/IFAS Standardized Fertilizer Recommendations (EDIS Publication SL 129; <https://edis.ifas.ufl.edu/publication/SS163>). These recommendations are based on soil test results, forage species, and management factors. For instance, K fertilizer recommendations for bermudagrass range from 40 lb K₂O/A (when soil tests medium in K, 36 to 60 mg/kg of Mehlich-3 extractable K) to 80 lb K₂O/A (when soil tests low in K, < 35 mg kg⁻¹ of Mehlich-3 extractable K). For limpograss, K recommendations range from 20 to 40 K₂O/A when soil tests medium or low in K, respectively. For both forage species, an additional application of 40 lb K₂O/A is recommended after each harvest, except after the last harvest in the fall. For bahiagrass, in addition to soil test results, K recommendations also vary depending on N application level and how bahiagrass is utilized (grazed vs. harvested for hay). For instance, K recommendations for grazed bahiagrass range from 50 lb K₂O/A (when N is applied at 100 lb N/A and soil tests low in K) to 80 or 40 lb K₂O/A (when N is applied at 160 lb N/A and soil tests low or medium in K, respectively). When bahiagrass is grown only for hay, K is recommended at either 80 lb K₂O/A (when soil tests low in K) or 40 (when soil tests medium in K). Similar to limpograss and bermudagrass recommendations, an additional application of 40 lb K₂O/A is recommended after each bahiagrass harvest, except after the last harvest in the fall. Previous research at the University of Florida/IFAS Range Cattle REC evaluated different K fertilization regimens that maintained optimum bahiagrass, limpograss, and bermudagrass yield, nutritive value, and stand persistence (Adjei et al., 1998, 2001; Silveira et al., 2013, 2015, 2017; Yarborough et al. 2017a, 2017b). In addition, on-farm demonstration studies conducted in several locations in Florida also evaluated forage responses to K fertilization in fields that exhibited significant stand loss due to lack (or inadequate) K fertilization. Results from these efforts support the importance of adequate K supply to sustain forage productivity and long-term persistence. Reduced forage production and stand loss under limited levels of K fertilization should be considered in the economics of K fertilizer decisions. This issue is particularly important in warm-season grass pastures that are harvested multiple times per year.

Upcoming Event

See our website calendar for more information on upcoming event.

July 9, 11:00 – 11:45 a.m. Join us for the Ona Highlight ‘Wild Pig Management by Livestock Producers: Survey Results’ with Dr. Hance Ellington.

UF/IFAS Range Cattle REC - 3401 Experiment Station Rd., Ona - <http://rcrec-ona.ifas.ufl.edu/>